INIS-mf--12688

C. FOOD PRESERVATION

Radiation Preservation of Spices.

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The contamination of spices by micro-organisms may occur during harvesting, handling, transportation or storage. Processed spices with high bioburden accelerate the putrefaction of manufactured food products. Mold growth during long storage and shipment has also been causing quality changes and occasionally mycotoxis production.

Rice and wheat are the major cereals used as staple food all over the world. Many studies have been conducted on microflora and insect infestation of these grains and their possible control, but no emphasis has been given to shelf-life extension of cooked rice and wheat products. Both fumigation by ethylene oxide and heat sterelization have been used with varying degrees of success. However, these methods cannot be applied for sterilization of spices and other foods as they leave toxic residues and change organoleptic properties. For these reasons, spice traders and food industries are seeking other alternatives for decontamination. The use of gamm irradiation would, presumably be a good approach as it can kill the harmful organisms without altering the organolpetic properties.

Two varieties of red hot pepper (Punjabi and Kashmiri) were obtained from local market at Peshawar. The samples were dried and reduced to pass through 20 mesh. Packaging materials tested were polyethylene of two different thicknesses and cellophane

bags. The samples were irradiated at dose levels of 0, 2.5, 5.0, 7.5 and 10.0 kGy. The measurement of total fungal counts was done immediately after irradiation and then after successive 2 month storages. The results for the initial 4 months are given in Table-1 The initial fungal count ranged from 3120 to 6200 in

Table 1. Effect of irradiation and packaging materials on fungal count of Red Pepper (Punjabi and Kashmiri types).

Treatment (kGy)	Fungal count/g									
	0 day					60 days				
	0	2.5	5.0	7.5	10.0	0	2.5	5.0	7.5	10.0
	Type Punjabi									
PE (0.085mm)	6.2×10^3	1.3×10^2	5.6×10^2	1.5×10^2	0	1.3×10^4	9.5×10^3	3.0×10^3	5	0
PE (0.064mm)	3.2×10^3	1.4×10^3	1.8×10^2	10	0	8.6×10^3	2.7×10^3	5.9×10^2	16	0
C (0.025mm)	4.2×10^3	1.0×10^3	5.2×10^2	15	0	1.2×10^4	3.5×10^3	1.1×10^3	25	0
	Type Kashmiri									
PE (0.085mm)	7.0×10^3	3.0×10^3	6.5×10^2	2	0	1.3×10^4	9.5×10^3	2.9×10^3	5	0
PE (0.064mm)	1.9×10^3	1.5×10^3	8.0×10^2	16	0	8.6×10^3	2.7×10^3	5.9×10^3	16	0
C (0.025mm)	2.9×10^3	2.0×10^3	2.7×10^2	5	0	8.0×10^3	3.5×10^3	3.5×10^2	10	0

PE = Polyethylene C = Cellophane

Punjabi and from 1900 to 7000 counts/g in Kashmiri type. Also, at irradiation doses of 7.5 and 10.0 kGy, the total fungal counts decreased to almost undetectable levels in both the samples. After 2 months storage, the microbial load increased considerably upto irradiation dose of 5.0 kGy, while at the dose of 7.5 kGy only a few counts were noted. No mold growth was detected in samples treated with 10 kGy.

Percent reduction in microbial load at successive doses of gamma irradiation of 2.5, 5.0, 7.5 and 10.0 KGy was 21 to 57% 57 to 99.68%, 99.19 to 99.75% and 100%, respectively. After 2 months storage, the irradiated samples had 29-60% (for 2.5 kGy), 80 to 95% (5.0 kGy), 99.76 to 99.96% (7.5 kGy) and 100% (10.0 kGy) lower microbial load than the untreated samples. No effect of packaging materials was observed on fungal count.

2. Radiation Preservation of Cooked Foods.

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Roties (nans) and cooked rice + vegetables (vegetable polaw) were packaged in polyethylene bags. The samples were irradiated at dose levels of 7.5 and 10.0 kGy. Vaccum packaging was done by a locally designed method. Measurement of fungal count was carried out immediately after irradiation and then after each 15 days of storage upto 60 days. The samples were evaluated organoleptically as well. The data regarding microbial populations are given in Table-2. The initial fungal counts of roties with and without vacuum were 1.11×10^5 and 1.48×10^5 . Irradiation of roties at 7.5 kGy resulted in complete decontamination. After 15 and 30 days storage, the fungal count was 5 which increased to 15 and 20 after 45 and 60 days storage, respectively. Irradiation of roties at 10.0 kGy also resulted in complete sterilization of roties and no fungal growth was noted upto the storage time of 60 days.

In case of cooked rice + vegetables, no mold growth was detected upto 15 days storage at 7.5 kGy. Only twenty colonies were noted after 30 and 45 days storage and 35 after 60 days storage. Vacuum packaging restricted the number of colonies to 5 after 60 days of storage. Irradiation dose of 10 kGy was also a sterilizing dose for cooked rice as no mold growth was found after